Development of Multivitamin/Multielement Dietary Supplement SRM

NIST is working with the National Institutes of Health Office of Dietary Supplements (NIH/ODS) and the U.S. Department of Agriculture (USDA) in support of development of an analytically substantiated dietary supplement ingredient database (DSID). The initial DSID focus is characterization of vitamin and mineral supplements. As part of this effort, USDA will contract with analytical laboratories for analyses of dietary supplements available in the marketplace. NIST is producing a Standard Reference Material to be used as an analytical control in this study.

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NIST is producing ***Standard Reference Material 3280 Multivitamin/Multielement Tablets*** for use as a control by laboratories making vitamin or element measurements in similar types of dietary supplements. In cases where higher-order analytical methods were not already available at NIST, such methods (e.g., isotope dilution liquid chromatography with mass spectrometric detection (ID LC/MS)) have been developed for use in characterizing this SRM.

Characterization of ***SRM 3280*** Multivitamin/Multielement Tablets is nearing completion. Certified and reference values will be assigned for the 18 elements and 15 vitamins/carotenoids listed on a typical multivitamin/multielement dietary supplement label. Elements to be determined include: boron, calcium, chloride, chromium, copper, iodine, iron, magnesium, manganese, molybdenum, nickel, phosphorous, potassium, selenium, silicon, tin, vanadium, and zinc. The vitamins and carotenoids to be measured include: vitamin A, vitamin B_6, vitamin B_{12}, vitamin C, vitamin D, vitamin E, vitamin K, vitamin B_1, vitamin B_2, niacin, folic acid, biotin, pantothenic acid, ∃-carotene, and lutein.

A combination of results from two independent methods employed at NIST, including higher-order methods, as well as results from USDA and European laboratories expert in the measurement of vitamins will be used for characterization of this material. The elements were determined at NIST using a combination of several methods including x-ray fluorescence spectrometry (XRF), instrumental neutron activation analysis (INAA), prompt gamma activation analysis (PGAA), and inductively coupled plasma-mass spectrometry (ICP-MS) to provide measurements by at least two methods for each element. XRF was used to assess the homogeneity of the SRM for most of the elements.

The vitamins and carotenoids are being measured at NIST using two independent analytical methods (where feasible) based on liquid chromatography (LC) with UV/visible absorbance or fluorescence detection, LC with mass spectrometric detection (LC/MS), and/or LC with tandem mass spectrometry (LC/MS/MS). The SRM's homogeneity with respect to the vitamins will be assessed using these methods.

For both the vitamin/carotenoid and element determinations, samples of the SRM were distributed to other laboratories (e.g., USDA, Food Products Association, European Committee for Standardization (CEN)) to provide additional results to assist in the value assignment of the contents of the SRM.

USDA, NIH, and CDC will use the multi-vitamin SRM as a control material in support of on-going measurements of vitamins and elements in dietary supplements to be included in the DSID.

Dietary supplement manufacturers will also use the SRM as a control material for quality assurance of measurements so that label claims for their own products are accurate.

Analytical laboratories will use the material for quality assurance and method validation.

As database and product label information become more accurate, researchers will be better able to accurately estimate vitamin and element intakes from dietary supplements.